



UNITED STATES PATENT AND TRADEMARK OFFICE

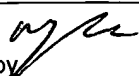
cen
UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,261	12/05/2003	Robert R. Rice	000352-804	1178
26294 7590 03/13/2007 TAROLLI, SUNDHEIM, COVELL & TUMMINO L.L.P. 1300 EAST NINTH STREET, SUITE 1700 CLEVEVLAND, OH 44114			EXAMINER VAN ROY, TOD THOMAS	
			ART UNIT 2828	PAPER NUMBER

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/729,261	Applicant(s) RICE ET AL.	
	Examiner Tod T. Van Roy 	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claim 11.

Response to Arguments

Applicant's arguments see Remarks, filed 12/11/2006, with respect to claims 1-17 have been fully considered and are persuasive. The rejection of claims 1-17 has been withdrawn.

The examiner agrees that although the Sasaoka reference teaches use of multi-wavelength components, it does not clearly teach the fiber to be multimode.

The examiner does not agree that the Sasaoka reference fails to teach radially dependent doping of the core. Figure 1b demonstrates the refractive index profile of the fiber, which is varied due to the doping levels. As the index varies radially from the center of the core it is inherent that the doping does as well. If the dopant profile were to differ, the refractive index profile would not take on the parabolic/graded index shape seen in the figure. Additionally, a reference noted, but not relied upon, teaches that it is well known in the art to radially vary the dopant concentration through the core to form a graded index fiber (US 6229945, col.2 lines 45-48).

As new rejections based on previously cited prior art references are being made, the current action will be made non-final.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2828

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka et al. (US 2002/0135866) in view of Rice (US 6363087).

With respect to claim 1, Sasaoka teaches an optical fiber ([0011], taught to amplify a plurality of wavelength components) comprising: a core having a longitudinal optical axis (fig.1a #101) and incorporating radially dependent amounts of dopant materials ([0022], creating the refractive index profile seen in fig.1B) to provide a desired refractive index profile and a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes (would inherently allow higher Raman gain along the optical axis and promote lower order modes and discriminate against higher order modes- due to being single mode, and after combination with Rice the prior art fiber would have identical properties to the applicant's fiber), and a cladding region surrounding the core and having a refractive index different from that of the core material (fig.1a #102, fig.1b #151/152), wherein light launched into an end of the fiber is subject to higher Raman gain along the optical axis (due to doping profile), which promotes lower order modes and discriminates against higher order modes. Sasaoka does not teach the fiber to be multimode. Rice teaches a

Art Unit: 2828

multimode Raman amplifying fiber (abs.) that is formed to allow propagation of lower order modes while discriminating against higher order modes (col.4 lines 20-26). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber of Sasaoka with the core and cladding sizing of Rice (col.4 lines 14-36) in order to allow for increased amplification of the lowest order mode while enabling efficient pumping via multimode pump sources (col.4 lines 32-36).

With respect to claims 2-3, Sasaoka teaches the radially dependent index, gain, and doping profile outlined in claim 1, and additionally teaches the use of a transparent oxide ([0022] GeO₂), and the refractive index and Raman gain coefficient have their highest values along the optical axis of the fiber (fig.1B, due to doping profile).

With respect to claim 4, Sasaoka teaches the refractive index profile and Raman gain coefficient profile both have a generally parabolic shape with a peak coinciding with the optical axis of the fiber (fig.1B, due to doping profile).

With respect to claim 5, Sasaoka teaches the dopant concentrations are selected to provide a measure of control over the refractive index profile and the Raman gain coefficient profile (inherent that the doping of the Silicon fiber would adjust the refractive index and Raman gain profile).

With respect to claims 12-13, Sasaoka teaches the optical fiber as defined in claim 1, wherein the doping profile comprises radially dependent amounts of dopant materials comprising a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis (fig.1B, inherently providing for higher Raman gain along the optical axis).

Claims 6-9, 11, and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka and Rice in view of Clarkson (WO 02/50964 A2).

With respect to claims 6-7, Sasaoka and Rice teach the fiber as outlined in the rejection to claim 1 above, but do not teach a diode laser array providing pump power to the fiber, means for launching the pump power into the fiber, and reflective means defining a laser cavity. Clarkson teaches a fiber laser system (fig.8a) which includes a diode laser array providing pump power to the fiber (fig.8a #13), means for launching the pump power into the fiber (fig.8a #15), and reflective means defining a laser cavity (fig.8a #50, 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber of Sasaoka and Rice with the fiber laser system of Clarkson to pump the fiber gain medium and provide feedback allowing for generation of Raman amplification and oscillation of the laser signal for transmission.

With respect to claims 8-9, Sasaoka, Rice and Clarkson teach the fiber laser as outlined in the rejection to claim 6, and Clarkson additionally teaches a highly reflective mirror at one end (fig.8a #50, pg.19 lines 20-25), and a partially transmitting mirror at

Art Unit: 2828

the other (fig.8a #55, pg.21 lines 18-21), including outputting an essentially collimated beam to the output mirror (pg.21 lines 3-5). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber laser of Sasaoka, Rice and Clarkson with the mirror reflectivities and lenses of Clarkson in order to allow for the oscillation of a given percentage of the light input into the fiber, to make use of the gain medium, as is well known in the art, as well as to properly spatially position the beam for coupling to any additional optics.

The method of claim 11 is rejected as being taught by Sasaoka, Rice and Clarkson as outlined in the rejection to claim 6.

With respect to claims 14-17, Sasaoka, Rice and Clarkson teach the fiber laser and method as outlined in the rejection to claims 6 and 11, wherein Sasaoka teaches a multimode input ([0011]), and the doping profile comprises radially dependent amounts of dopant materials comprising a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis (fig.1B, inherently providing for higher Raman gain along the optical axis).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka, Rice, Clarkson, and further in view of Paldus et al. (US 2003/0161361).

With respect to claim 10, Sasaoka, Rice and Clarkson teach the fiber laser system as outlined in the rejection to claim 6, including the use of multiple lenses (Clarkson, pg.21 lines 6-7), but do not teach the use of a pinhole filter. Paldus teaches a

Art Unit: 2828

laser system using a pinhole filter ([0071]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser system of Sasaoka, Rice and Clarkson with the filter of Paldus in order to utilizing a bandpass method to spatially filter the output light.

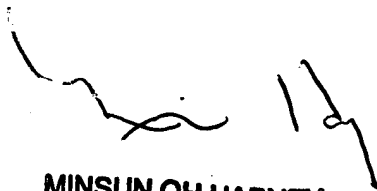
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR



**MINSUN OH HARVEY
PRIMARY EXAMINER**